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Taxonomic notes on *Hypomecis tetragonata* (Walker) (Geometridae, Ennominae) with a description of its allied new species from South East Asia

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Abstract Taxonomic notes on *Hypomecis tetragonata* (Walker) are given, with a description of *H. norikoae* sp. n. from Laos, Thailand, P. Malaysia, Borneo and Sumatra.

Key words *Hypomecis*, Geometridae, new species, SE-Asia.

Hypomecis tetragonata (Walker) was described from Borneo as a member of the genus *Macaria* Curtis. Holloway (1994) transferred it to the genus *Hypomecis* Hübner, though it is quite different from its other congeners in superficial appearance in that its wings are uniformly coloured in pale grey. However I support his treatment, because the male genitalia of *tetragonata* clearly show it to be a typical *Hypomecis*. During a careful examination of many specimens of "*tetragonata*" from South East Asia, I found that two separate species were present among them, one of which should be described as new to science. To confirm the taxonomic status of the two species, I examined the type specimens of *tetragonata* and its related three taxa, partly with the help of Dr Stüning.

The following acronyms are used to indicate the location of the specimens. BMH: Bishop Museum, Honolulu, USA. BMNH: The Natural History Museum, London, UK. MNHU: Museum für Naturkunde der Humboldt-Universität zu Berlin, Germany. NIAES: Natural Resources Inventory Center, National Institute for Agro-Environmental Sciences, Tsukuba, Japan. OUM: Oxford University Museum of Natural History, UK. MS: Manfred Sommerer collection, Munich, Germany. ZFMK: Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn, Germany.

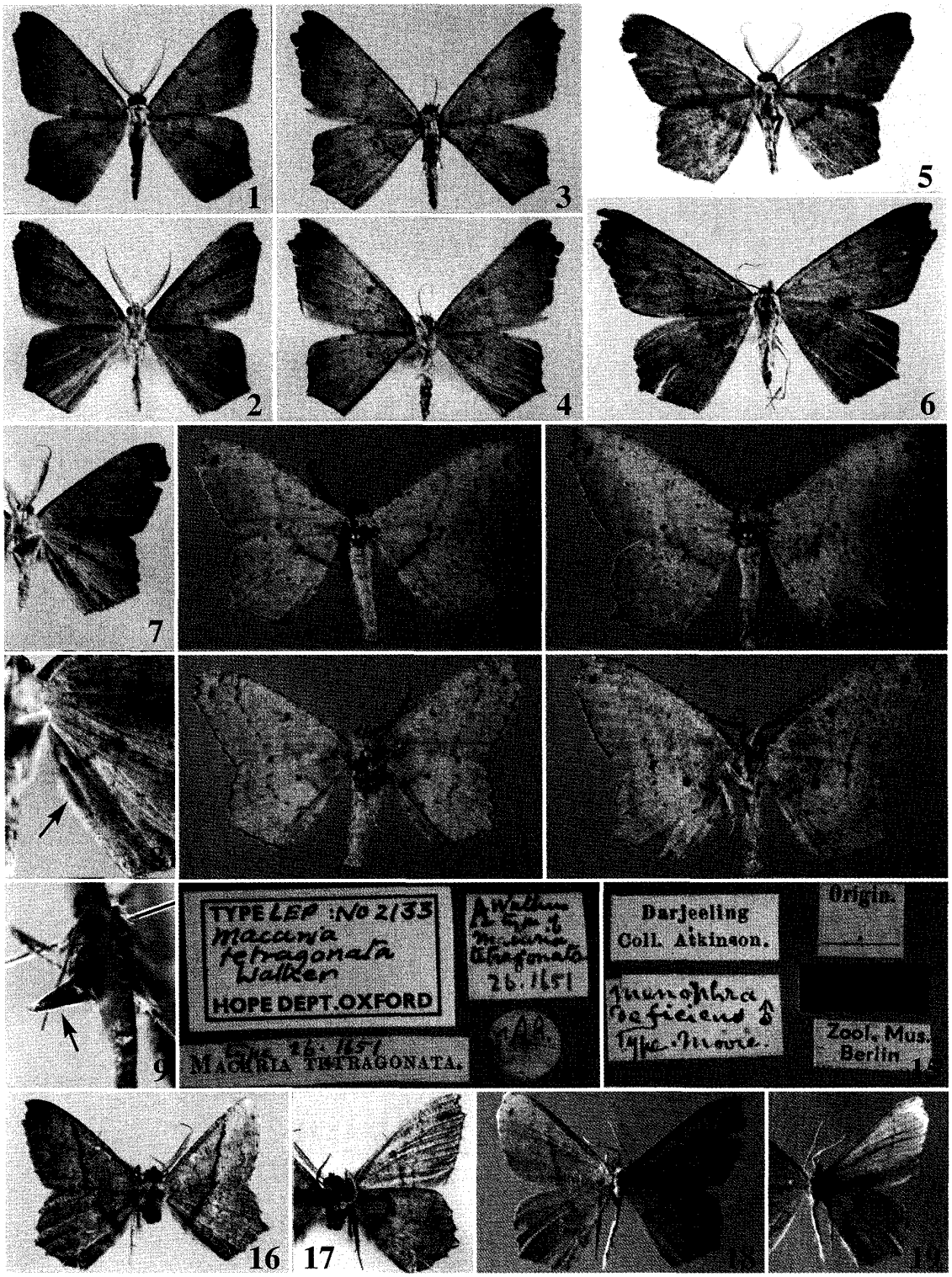
Unless stated otherwise, all the specimens including the type material recorded in this paper will be deposited in NIAES.

Hypomecis tetragonata (Walker) (Figs 5–19)

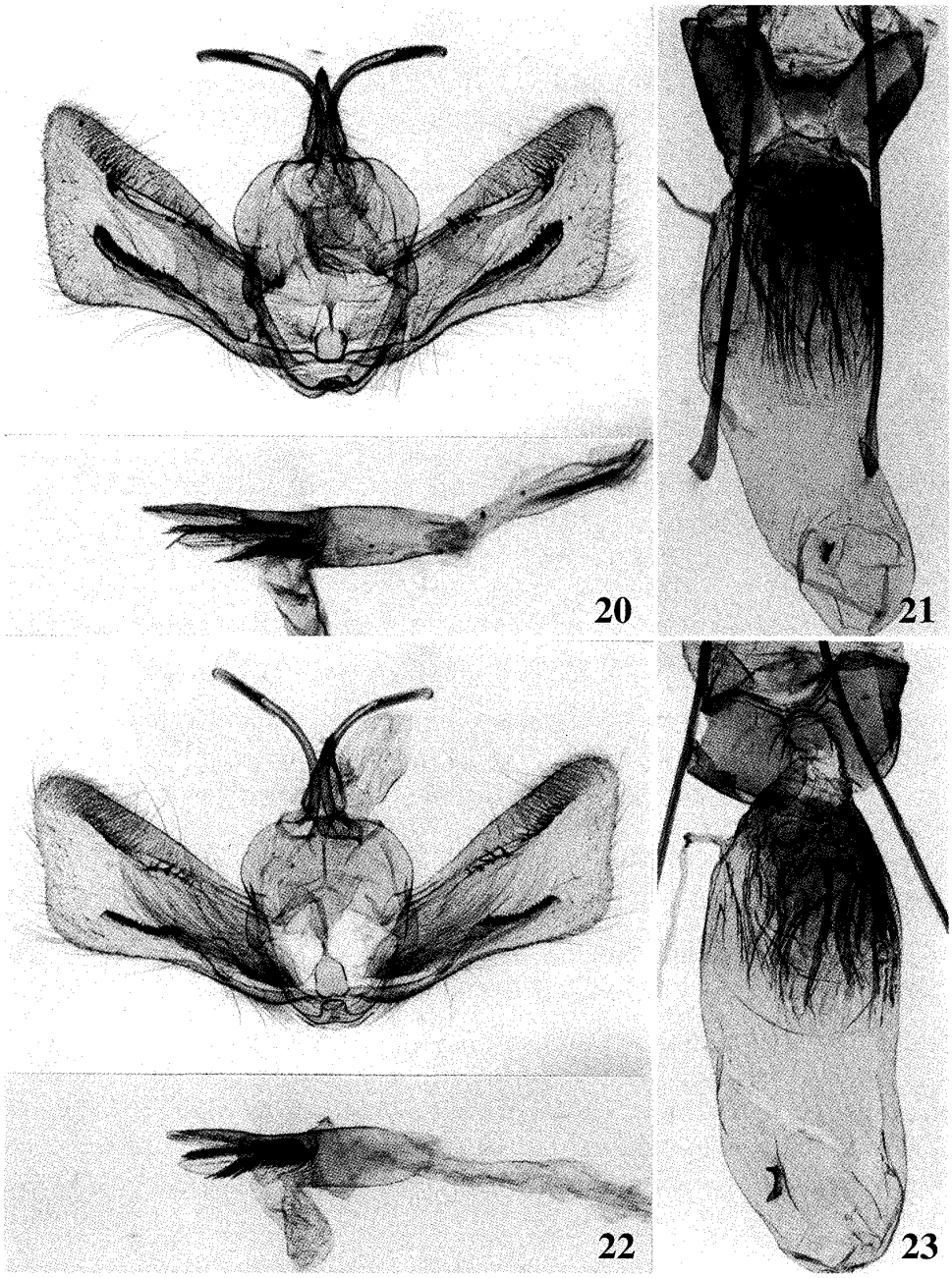
Macaria tetragonata Walker, 1863: 1651.
Hypomecis tetragonata: Holloway, 1994: 244, pl. 16: 21, fig. 519 (male genitalia).
Hypomecis tetragonata tetragonata: Parsons *et al.*, 1999: 477.
Menophra deficiens Moore, 1888: 237, pl. 8, fig. 23.
Maidana pallidiplaga Warren, 1899: 351.
Gonaphaga cinnamomaria Rothschild, 1915: 218.
Hypomecis tetragonata cinnamomaria: Parsons *et al.*, 1999: 477.

Length of forewing ♂ 19–21 mm, ♀ 19–25 mm, wingspan ♂ 32–39 mm, ♀ 28–45 mm.

This and the next new species are very similar to each other in external and genitalic characters. The discriminating characters are noted under the new species described below. Male and female genitalia are shown as in Figs 22 and 23. Male genitalia were also illustrated by Holloway (1994, fig. 519).



Figs 1–19. *Hypomecis* spp. 1–4. *H. norikoae* sp. nov. 1–2. Holotype. ♂, Sumatra. 3–4. Paratype. ♀, P. Malaysia. 5–9. *H. tetragonata* (Walker). 5. ♂, Sumatra. 6. ♀, Sumatra. 7. ♂, underside, Sumatra. 8. ♂, underside of hindwing, maginfied. Arrow indicates a patch of yellow hairs. 9. ♂, hind-femur with blackish hairs, magnified, indicated by an arrow. 10–19. Type specimens and their labels. 10–12. Syntype of *Macaria tetragonata* Walker. ♂, OUM. Photos by Dr Stüning. 13–15. Syntype of *Menophra deficiens* Moore. ♂, MNHU. Photos by Dr Stüning. 16–17. Syntype of *Maidana pallidiplaga* Warren. ♂, BMNH. 18–19. Holotype of *Gonaphaga cinnamomaria* Rothschild. ♂, BMNH.



Figs 20–23. Genitalia of *Hypomecis* spp. 20–21. *H. norikoae* sp. nov. 20. ♂, RS-6434. 21. ♀, RS-6432. 22–23. *H. tetragonata* (Walker). 22. ♂, RS-6428. 23. ♀, RS-6429.

Type material examined. Syntype of *Maidana pallidiplaga* Warren (Figs 16–17). ♂, "Sud-Est I. [Sudest I.], April 98, (Meek)/Rothschild Bequest B. M. 1939-1/Geometridae genitalia slide No. 16252", BMNH. Genitalia checked. Holotype of *Gonaphaga cinnamomaria* Rothschild (Figs 18–19). ♂, "*Gonaphaga cinnamomaria*, Type, Rothsch./Type/Mansela, Centr. Ceram, 650 m, 1912, (E. Stresemann)/89/Rothschild Bequest, B. M. 1939-1", BMNH.

I have not seen the syntypes of *Macaria tetragonata* Walker (OUM) and *Menophra deficiens* Moore (MNHU), but Dr Stüning kindly examined them and supplied photos of the moths and their genitalia. They are shown in Figs 10–15.

Material examined. Thailand: Doi Suthep, 1 ♀, 1. v. 1987 (S. & A. Saito). Philippines: Mindanao Is., Misamis Or., Mt Balatukan, 15 km SW of Gingoog, 1,000–2,000 m, 1 ♂, 27–30. iv. 1960 (H. Torrevillasa), Misamis Or., Mt Kibungol, 20 km SE of Gingoog, 700–800 m, 1 ♂, 9–18. iv. 1960 (H. Torrevillasa), Misamis Or., Minalwang 1,050 m, 1 ♂, 4. iii–4. iv. 1961 (H. Torrevillasa), in BMH; Palawan Is., Brooks Pt., 2 ♂, 14. v. 1995 (native collector), Mt Mantalingajan 950–1,000 m,1 ♂, 6–14. i. 2000 (native collector). Borneo: Sabah, Mt Kinabalu, Park H. Q. 1,560 m, 1 ♂, 8–18. xi. 1979 (T. Hasegawa). Sumatra: Dolok Merangir, süd. Medan, 170 m, 1 ♂, 16. v. 1979 (E. W. Diehl), Ache Ketambé, 1 ♂, 29–30. xi. 1980 (E. W. Diehl), "Holzweg 3" 1,150 m, 14 km NE Prapat, 1 ♀, 18. ii. 1982 (E. W. Diehl), in MS; Barus, Sibolga, Mt Pinapan, 1 ♂, ix. 1997 (native collector). Sulawesi: Palolo, 1 ♂, x–xi. 1985 (S. Nagai), Tondano, 1 ♂, v. 1988 (native collector). Indonesia, Halmahera Is.: 15 km SE Baru, 1 ♂ 1 ♀, 17. v. 1998, 1 ♂, ix–x. 1998 (native collector), Kau, 2 ♂ 3 ♀, vi. 1998 (native collector, *ex* coll. U. Paukstadt), in ZFMK.

Geographical range. India, Thailand, Philippines (Palawan, Mindanao), Borneo, Sumatra, Halmahera, Seram, Sulawesi, Louisiade Archipelago (Rossel, Sudest).

***Hypomecis norikoae* sp. nov.** (Figs 1–4)

Length of forewing ♂ 18–21 mm, ♀ 21–23 mm, wingspan ♂ 31–37 mm, ♀ 33–38 mm.

Male. Similar to *tetragonata* in wing colour and maculation, but different from it as follows. Both wings more lightly irrorated with fuscous, giving a paler and more evenly coloured appearance; lines less defined, especially medial lines, which have almost disappeared; underside of hindwing without a patch of yellowish hair, which is developed between veins Cu_2 and A in *tetragonata* (Fig. 8). Femur of hindleg densely covered with pale yellow hairs, while in *tetragonata* with blackish hairs (Fig. 9).

Female. No reliable external features for separation from *tetragonata*. Most useful characters for identification are found in the genitalia.

Male genitalia (Fig. 20). Similar to those of *tetragonata*. Valva more enlarged distally, ventral margin more deeply curved. Mid-ventral margin of cucullus more dilated. Two spinose processes developed in the centre of valva; the subcostal process longer as a whole, but spines shorter and less in number; the saccular process bearing numerous short robust spines, dorsal margin almost smooth, not so curved as in *tetragonata*. Easily distinguished from those of *tetragonata* by valva enlarged dorsally and straightish saccular process.

Female genitalia (Fig. 21). Similar to those of *tetragonata*, but lamella postvaginalis more deeply concave medially, signum smaller.

Holotype. ♂. N. Sumatra, "Holzweg 2" 1,050 m, 18 km to Prapat, 29–30. vii. 1985 (R. Sato). Paratypes. Sumatra: type locality, 2 ♂, 22–24. vii. 1985 (R. Sato), 2 ♂, 20. v–22. vii. 1985, 2 ♂, 2. xii. 1991 (E. W. Diehl), "Holzweg 3" 1,200 m, 18 km to Prapat, 2 ♂, 25–26. vii. 1985, 1 ♂, 30–31. vii. 1985 (R. Sato), Karo Highland, 2 ♂, 11–14. iii. 1978 (T. Hasegawa); "Holzweg 2" 1,050 m, 1 ♂, 24–27. viii. 1995 (M. Sommerer), "Holzweg 3" 1,150 m, 14 km NE Prapat, 1 ♂, 14. viii. 1982, 1 ♂, 21. x. 1982, 1 ♂, 28–30. xi. 1982, 1 ♂, 25–31. i. 1984 (E. W. Diehl), Dairi-Berge 1,600 m, 30 km E. Sidikalang, 1 ♂, 22. viii. 1991 (E. W. Diehl), Toba-See Ostseite 1,100 m, Prapat, 1 ♂, 6. vi. 1975, 1 ♂, 27. xii. 1975, 1 ♂, 1. i. 1982 (E.W.Diehl), Ache, Ketambe 400 m, 1 ♂, 28. xii. 1980 (M. Sommerer), Aceh, Alur Inas Süd, Gunung Loién 1,200 m, 1 ♂, 29. i. 1989 (Plössl & Tarmann), Dolok Merangir 170 m, S. Medan, 1 ♂, 10. v. 1976, 1 ♂, 28. ix. 1976 (E. W. Diehl), in MS; "Holzweg 2" 1,050 m, Tiga-Dolock, 2 ♂, 25. v. 1972 (Roesler & Kueppers), Berastagi, 1

♂, 4. vi. 1972 (Roesler & Kueppers), in ZFMK. Borneo: Mt Bawang, 1 ♂, vi. 1990 (N. Nishikawa). P. Malaysia: Cameron Highlands, 2 ♂2 ♀, x–xii. 1985 (K. C. Liek), Taiping, Bukit Larut 1,113 m, 1 ♂, 23. viii. 1990 (T. Yasunaga), Fraser's Hill, 1 ♂, 29. iv–5. v. 1993 (T. Tanabe), 1 ♂, 4. v. 1994 (N. Bito). Laos: Bori Kham Xai, Laksao, Guesthouse 200 m, 2 ♂, 18–19. ix. 1998 (T. Masui). N. Thailand: Chiang Mai Prov., Doi Suthep, 1 ♂, 6. xii. 1988 (Cotton), Doi Suthep 1,325 m, Meo Village View Point, 1 ♂, 22. xi–4. xii. 1989 (H. Schnitzler), Doi Suthep, 1,050 m, 4 ♂, 24. xi. 2000 (D. Stüning), Maemoh, Lampang, 1 ♂, 28. xii. 1989 (Cotton), in ZFMK.

Geographical range. Laos, Thailand, P. Malaysia, Borneo, Sumatra.

Etymology. The new species is named after my wife, Noriko Sato, in gratitude for her long patience with the inconvenience of numerous moth-specimens around the home.

Acknowledgement

I am much indebted to Mr D. Carter (BMNH) and Mr G. Martin (BMNH), who kindly helped me in examining the type material under their care. I also wish to express my cordial thanks to Dr D. Stüning (ZFMK) for providing me with the photographs of the type specimens with useful information and the data of the new species from the collection in ZFMK, to Dr S. E. Miller (BMH, now Smithsonian Institution, National Museum of Natural History, Washington) for his permission to study specimens under his care. I deeply thank Dr H. Inoue (Iruma) for his critical reading through the original manuscript, Mr M. Sommerer (Munich) for the loan of valuable specimens, and the late Dr E. D. Diehl (Sumatra) for providing many specimens. My thanks are also due to Messrs N. Bito, H. Yasunaga, S. Saito, T. Tanabe, T. Masui, for their kindness in offering me valuable specimens.

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摘　　要

Hypomecis tetragonata (Walker) (シャクガ科エダシャク亜科) の知見と東南アジア産の1近似種の記載 (佐藤力夫)

Borneoから*Macaria*属として記載された*tetragonata* Walkerは，翅全体が黄褐色から褐色で，*Hypomecis*属とはかなり異質な感じを与えるが，雄交尾器の特徴が一致することから，現在は同属の一員として扱われている (Holloway, 1994). 私もその取り扱いを支持するが，このほど，"*tetragonata*" の中に2種混じていることが判明し，関連するタイプ標本を調査した結果，近似の未記載種であると

の結論を得たので, 新種として記載するとともに, *tetragonata* との異同を明らかにした.

Hypomecis norikoae Sato (新種)

現在までに Laos, Thailand, P. Malaysia Sumatra, Borneo から採集されている.

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